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ON
ATTEMPTED CURES OF DEAFNESS.

BY GEORGE E. DAY.

(From "Silliman's American Journal.")

1850.

COLUMBIA INSTITUTION

—FOR THE—

DEAF AND DUMB

THE CHARLES BAKER COLLECTION

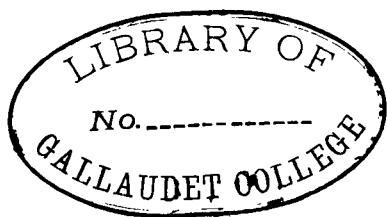
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ART. VII.—*On the late efforts in France and other parts of Europe to restore the Deaf and Dumb to hearing* ; by **GEORGE E. DAY**, late Instructor in the New York Institution for the Deaf and Dumb.

THE common opinion that in the deaf and dumb, the vocal organs and the nerves of hearing are simultaneously affected, is by no means of recent origin or confined exclusively to the unreflecting and ignorant. It is related by Itard that at a public exhibition of the Paris Institution, a distinguished prelate opened the mouth of one of the pupils and took hold of his tongue, with the view of discovering the cause of his dumbness. Previous to the sixteenth century, it seemed to have been the general, if not the universal opinion of both medical and philosophical observers, that dumbness was in all cases the result of organic defect in the organs of speech. The fact, however, that deaf mutes have the power of uttering vocal sounds, and that in many of the European institutions they are taught to enunciate words and to speak, demonstrates beyond the possibility of doubt the incorrectness of this conclusion. It is now universally admitted, among the well informed on the subject, that *deaf mutes are dumb, simply because they are deaf.*

Without examining fully the long and dismal train of evils which the want of hearing, whether congenital or contracted in infancy, produces, it is at present sufficient to remark, that the deaf and dumb, though not by nature inferior to their more fortunate fellow men, are yet in fact immensely below them.

Before instruction, they know nothing of the past or future : nothing of the history of other times, or the experience of other men : nothing of those great truths of man's immortality, of his spiritual being, and his relations to God. Even the existence of God is to them unknown and unsuspected. In the midst of a Christian community, they are heathens : living in a civilized nation, they are barbarians : surrounded by men of cultivated intellect, they yet remain in mental infancy.

If, now, hearing could be given to these children of misfortune, a change would instantly take place in their mental character. Once in the possession of the power of hearing, *language* would shortly be acquired, and with it that multitude of ideas of which its terms are the signs. The deaf mute would then possess the means of

learning the truths which have been wrought out by the study of ages, and of becoming acquainted with those higher and more important truths revealed from God. He might mingle on equal terms with the community about him, and be urged onward in improvement by that ceaseless activity of the minds of men, which their union in society produces. He might take his place in the social and family circle, and participate in those kindly thoughts and feelings which do so much to refine the disposition and soften the heart. He might learn the way of life and truth, and be prepared for an “inheritance incorruptible, undefiled, and that fadeth not away.”

With these facts in view, the attention of a number of skillful and distinguished European physicians, who were under the most favorable circumstances for making experiments, was directed, a few years since, to the possibility of restoring the deaf and dumb to hearing. Among others are found the names of *Sir Astley Cooper, Curtis, Itard, Deleau, and Guyot*,—men who to acknowledged surgical and medical skill, united a degree of enthusiasm and perseverance, which afforded the surest pledge, that the obstacles in their way, ifvincible, would certainly be overcome. Now that the excitement which then existed in relation to the subject has passed away, we propose to make an impartial examination of the results of their labors, with the view of ascertaining to what extent, and in what cases, if any, deafness when so great as to prevent the acquirement of language, may, in the present state of medical science, be cured.

The first object was to ascertain, if possible, the *causes* of deafness, by *post mortem* examination. The anatomical observations which had previously been made in this department, were too few and incomplete to render any conclusions which might be founded upon them, of any great value. In view of the necessity of more accurate and extensive observations, the institution for the deaf and dumb at Copenhagen announced to the world, a few years since, their intention of requesting the bodies of their deceased pupils from their friends, for the purpose of dissection. What were the results of the examination, or how far they succeeded in obtaining their consent to this request, we are not able to state, as nothing has since been published in relation to the matter. The able physician, however, of the Paris Institution, M. *Itard*, has materially added to the knowledge which formerly existed in this obscure region of physiology. For several years he entertained the opinion, from the total absence of any perceptible defect in the organ of hearing, that deafness, when so

great as to occasion dumbness, was always caused by paralysis of the labyrinthic nerve. Such, in fact, is the negative condition in which the ear and the parts connected with it, present themselves to the eye of the dissector, in the great majority of deaf mutes. Farther and more accurate observation, however, enabled him to discover, in some cases, palpable causes of this defect. He twice found the cavity of the tympanum filled with concretions of a chalky appearance, and in two other instances with fungous excrescences, in connection with the loss of the membrane of the tympanum and the little bones. A fifth subject presented a mass of gelatinous matter, which filled not only the cavity of the tympanum, but the semi-circular canals of the labyrinth. In another, who died after two years of malignant fever, the auditory nerve had little more consistence than mucus. Others have found the Eustachian tube in some cases filled, and in others completely obliterated. The partial or total imperforation of the meatus auditorius has been observed. Morbid affections of the tympanum of a nature opposed to the transmission of sound have been met with. Other organic defects have been discovered ; but the requisite scientific technicality would render it improper to describe them here.

The results thus obtained, inform us only of the defects of the organ of hearing, and the manner in which they prevent it from becoming the vehicle of sound. If we search farther and inquire how these defects arise : the answer is, that in many cases they are congenital, and in many others are produced by disease or accident after birth. From inquiries instituted by several of the institutions for the deaf and dumb in Europe, and in this country by the American Asylum, it appears that of four hundred and forty five deaf mutes, respecting whom inquiry has been made, two hundred and forty four became deaf after birth, and two hundred and one were born in that condition ; and that the causes to which the loss of hearing was most commonly attributed, were fevers, especially the scarlet fever, epileptic fits, convulsions, inflammation of the brain, the small pox and measles, blows on the head, violent falls, etc. Copious details on this subject will be found in the third biennial circular of the Paris Institution.*

* *Troisième circulaire de l'Institut royal des sourds-muets de Paris, a toutes les institutions de sourds-muets de l'Europe, de l'Amérique et de l'Asie.* Paris, 1832.

On the whole, there can be little doubt, that the causes of that degree of deafness which is followed by dumbness, may be the same which weaken or destroy the sense of hearing in adults. In two respects, however, a difference exists, which for practical purposes, nearly destroys the comparison. In the first place, organic defects as material causes of deafness, are of much more unfrequent occurrence among the deaf and dumb, than among adults ; and, secondly, in the case of the former, deafness is nearly always connected with paralysis, either natural or acquired, of the organ of hearing.* To restore an organ, for years unused and paralyzed to its full and perfect exercise, must be, under the most favorable circumstances, extremely difficult ; but the difficulty is greatly increased in the case of the deaf and dumb, from the carelessness and frequently the resistance of the patient ; from his want, in many cases, of intelligence and the fear with which prolonged operations inspire him, and from the absence of a perfect understanding between him and the physician. It thus not unfrequently happens, that notwithstanding the most rigid examination of the membrane of the tympanum by the rays of the sun, and after the most careful means have been taken to ascertain the permeability of the Eustachian tube, by blowing the nose, and by expiring strongly with the mouth and nostrils closed, the physician is obliged to act in the dark : to choose at random a mode of operation which is frequently painful, sometimes fatal, and rarely if ever successful.

It would, however, be equally incorrect and discouraging to infer that the sense of hearing has never, under any circumstances, been restored to the deaf and dumb. Itard† has given an account of all the cases in which congenital deafness had been cured, previous to the efforts of himself and his contemporaries. The number is so small, that we propose to present them to our readers, before entering on the examination of the recent and what may be termed, the more scientific efforts to accomplish the same result.

Case 1. To Amatus of Portugal we owe the first account of the cure of deafness when connected with dumbness. His observation however is by no means a full description. He only informs us that a child who was dumb till twelve years of age, at the end of that period, began to talk easily and plainly ; and that her cure was ow-

* Itard.

† *Traité des maladies de l'Oreille et de l'Audition.* Tom. II. Paris, 1821.

ing to a seton applied to the back of the neck, which dried up, in the course of time certain feculent humors (certaines humidités excrémentielles) with which the head was filled. Although he makes no mention of deafness, it is impossible to attribute her dumbness to any other cause. The supposition is confirmed by the fact that he relates it in connection with another cure of accidental deafness.*

2. The next observation was communicated to Lazarus Rivière by Desgrands Prés, a physician of Grenoble. A wandering beggar arrived by night at Pousenac, with his sick (deaf mute) child, who was suffering under a continued fever. For several days, they were charitably entertained and provided for, but at length the father, despairing of the child's life, abandoned him to his fate and secretly left the place. The patient however was cured, and on his full recovery was employed to take care of the sheep. Some years afterwards, he received a blow on the occiput, which fractured the bone in several places; but the wound, under the care of an able surgeon, was fortunately healed. In proportion as the cure advanced, the sense of hearing recovered the exercise of its functions, so that the man began to mutter a few words, and in a short time he was able to hear and speak distinctly. This power he retained to the end of his life.

3. The third case is that of a young man, deaf and dumb from birth, the son of a laborer of Chartres. At the age of twenty four years he suddenly began to speak, to the great astonishment of the whole town. It was ascertained from him that three or four months before, he had heard the sound of the bells, and was extremely surprised by this new and unknown sensation; and that subsequently, an aqueous discharge had taken place from his left ear, after which he heard perfectly with both. For three or four months he listened without speaking; this time he spent in repeating to himself the terms which he heard, and in becoming acquainted with the pronunciation of words and the ideas attached to them. At the end of that period believing himself sufficiently acquainted with language, he broke silence and began to speak, although very imperfectly.

Able theologians immediately questioned him with respect to his past condition, especially his ideas of God, the soul, and the moral quality of actions. Of these last subjects, he seemed not to have the slightest notion. Although he had been present at mass and

* *Curationum medicinalium Centuriæ septem.*

had been taught to make the sign of the cross, he had neither attached any meaning to these ceremonies, nor understood the object for which they were practiced. He had not formed a distinct idea of death, and in fact had never thought of it. He had passed a purely animal life, with not a single idea, except those derived from the senses.*

4. An instance is mentioned by M. Varroine, a French physician in the suite of Lucien Bonaparte, in which the application of the *moxa*† seems to have been successful. The patient was a young lady of Malaga, twenty years of age, who was born deaf. On carefully examining the organs affected, the tongue appeared to him a little thicker than usual. M. Varroine, regarding the deafness therefore as the result of a simultaneous paralysis of the ear and *tongue*, applied two *moxas*; one on the back of the neck, and the other under the chin, as near as possible to the root of the tongue. The two *moxas*, each of the diameter of a crown, produced about the seventh day a lively inflammation: an extraordinary swelling appeared on the anterior part of the neck, and extended down to the breasts, accompanied with a violent fever, which continued 24 hours and ended in a copious perspiration. The scabs fell off on the twelfth or fourteenth day, and their loss was followed by a very considerable suppuration. The operator affirms that the tongue, at this period, was more free in its movements, and was *diminished in thickness*. In consequence of fumigations made in the *meatus auditorius*, the membrane which lines it was excoriated and furnished, about the twenty second day of the treatment, a thick, yellowish humor which flowed abundantly during six days; these depuratory efforts were succeeded by a voracious appetite, and an increase of cheerfulness and intelligence.

About two months and a half after the application of the *moxas*, the young lady, to her great joy and astonishment, began to hear the ringing of the bells. From that period, her hearing continued to improve, and in a short time her deafness was completely dissipated. At the same time her dumbness ceased, and when the mother of the young lady communicated this happy result to M. Varroine, who had left Malaga, she articulated distinctly the words which she heard.‡

* *Histoire de l'Académie des sciences, année 1702.*

† A lanuginous or cottony substance, which is burnt slowly in contact with the skin, for the purpose of producing cauterization.

‡ *Mémoires sur les bons effets du moxa dans les cas désespérés.*

"In reading this observation," observes M. Itard, "it is impossible not to see the error of the author in supposing that he had a case of simultaneous paralysis of the organs of hearing, and the organs of speech to prescribe for: and the degree to which he was prepossessed with the idea, since to support it, he imagined that the tongue was too thick, and that after the application of the moxa, its thickness was diminished. If, notwithstanding this mistake, the mode of treatment really succeeded; if the moxa under the chin partly contributed to the cure of the deafness, the sympathy which exists between this region and the ear easily explains the whole secret of the success. Paralysis of the tongue never causes complete dumbness: the articulation is defective, but there are some sounds which are distinctly heard. The same thing is true of the paralysis of the muscles of the larynx, which never causes a total privation of speech. The utterance is indeed feeble, and destitute of inflection, but yet it is intelligible. The vocal organs, then, in the case above cited, were not injured, and the cure of the deafness was sufficient to restore them to their functions."

5. In the year 1786, a man named Felix Merle, a botanical physician, as he styled himself, appeared at the Institution for the Deaf and Dumb at Bourdeaux, and commenced a course of treatment for deafness on all the pupils, amounting at that time to twenty six or twenty seven. It consisted in introducing, morning and evening, into each ear, a drop of a certain liquid of his own composition, which was kept there by a bit of cotton. This treatment was continued a month, but with no effect, except in two instances. The first is that of a young lad, eight or nine years of age, who in infancy had possessed the power of hearing, and had become deaf by an accident, but who yet heard a little with one ear. On the twenty third or twenty fourth day of the treatment, he experienced in both ears a very sharp pain. The pain gradually increased till the introduction of the liquid into the *meatus auditorius* became insupportable: two or three days after the first attack, a purulent discharge took place, in the middle of the night, from both ears; the child immediately began to hear more distinctly, so that the ear affected with total deafness, occupied the place of that which had retained some little sensibility, and the sense of hearing in the latter was still more improved. Though the hearing was by no means perfect, it was sufficient to enable the child to learn to speak and to make use of language; which he has ever since retained. It should be re-

marked however, that he has never heard or spoken as well as other men. The discharge from the ear, which continued only a few days, was not very copious and ceased spontaneously.

6. The second case in which this mode of treatment appears to have been successful, is that of a young lady, sixteen years of age, who was born with the organs of hearing in a sound condition, and at the end of fifteen or sixteen months, began to talk. The mother of the child was in the habit of taking her to the vineyard in which she was employed, and leaving her on the grass at a time when the weather was damp, while she herself was at work. It was not remarked at the time that the child suffered any inconvenience: but soon after, it was noticed that instead of improving in hearing and speech, she appeared to have lost both the one and the other. She had since remained deaf and dumb, and was making rapid progress from the instruction she was receiving in the Institution. About the twenty-fifth day of the treatment, she experienced in both ears a very sharp pain, which was so intolerable, especially when the liquor was introduced into the *meatus auditorius*, that she was obliged to be forcibly held. On the twenty-eighth day while in school, she felt an inclination to sneeze, which was immediately followed by a simultaneous discharge from both ears of a large quantity of very fetid purulent matter. The perfect re-establishment of hearing immediately took place, so that the young lady experienced a feeling of extreme terror, and firmly clung to what was at hand, under the apprehension, as she afterwards said, that the house was about to fall upon her. By degrees this feeling left her, but her hearing continued the same. As soon as she heard, she forgot or at least had no desire to use the common signs employed by the deaf and dumb, and rapidly learned to speak. At the end of six weeks she was able to ask for every thing that was necessary, and at the end of six months she spoke very well. Having, at that time, returned into the country, she lost somewhat of her facility in speaking. The discharge from the ears continued fifteen days or three weeks, and ceased shortly after.

Such is the account of all the well authenticated instances in which, previous to more recent efforts, the deaf and dumb have been restored to hearing. If too limited in number, to warrant any certain conclusion with respect to the extent to which congenital deafness might be cured, they yet were sufficient to show the *possibility* of so desirable an event, and to point out the means from which

success might be hoped. Of the six cases of cure cited above, one was spontaneous, and the remaining five were produced by extreme irritation of certain parts of the head by means of the moxa, the seton, a certain aqueous composition introduced into the ear, or a blow on the head.

Although many of these remedies may properly be called cruel, and are not unfrequently attended with danger, the object to be gained was too important, while any probability existed that their use would be followed by success, to suffer the experiment to be neglected. Accordingly, they were all employed by M. Itard a sufficient number of times to test abundantly their efficacy; but with how much success the following account will show.

The *moxa* was applied, under his direction to nine or ten deaf mutes: and he affirms that several of the pupils of the Paris Institution, before their connexion with it, had been submitted to the same treatment; but the case mentioned by M. Varroine is the only known instance in which its application has been attended with success. The employment however of the *actual cautery*, a remedy similar to the moxa, seems to have been accompanied with more fortunate results. The patient was a child of the age of four and a half years, possessing a good constitution, and in perfect health, but completely destitute of hearing and speech. The application of a cautery on each of the mastoid processes, with an iron heated white, was shortly followed by an abundant suppuration, and an eruption of purulent matter. At this time, signs of the re-establishment of hearing began to be observed. "The child turned his head, whenever a noise was made behind him, or any one spoke on an elevated tone: and it was noticed that he took pleasure in striking on the window with his hands and making the glass sound. As his restoration to hearing became more apparent, the child began to repeat a few words: though it was necessary to pronounce them very distinctly and in a loud tone of voice. Eighteen months after the operation the child spoke, or rather pronounced words, with considerable distinctness: for his deafness not having been completely dissipated, his case would properly be classed among those of the semi deaf." This restoration to hearing, although partial was sufficient to inspire a hope that the same treatment on others would produce similar results: but, as if to destroy all confidence in it as a means of cure, in three other cases of congenital deafness in which it was employed, it was not attended with the least success.

The two extraordinary cures accomplished at the Institution at Bordeaux, early attracted the attention of M. Itard, and induced him to make the greatest efforts to become acquainted with the composition of the remedy employed. This, however, its possessor utterly refused to disclose, but consented to send him a certain quantity of it, prepared by himself. This was employed on three deaf mutes, but without any effect whatever. When informed of its want of success, he alledged in excuse that it was owing to the *alteration of the liquid*, which was of such a nature, that after two or three days, it would lose its power. M. Itard then offered to buy the secret, but was refused on the ground that the discovery was one, which only the government should know and recompense. On the death of the inventor, however, his wife communicated to M. Itard the composition of the remedy.* As several of the ingredients were such as were known to be useful in cases of deafness, and as its use had been attended with such flattering success at Bourdeaux, it was employed on all the deaf mutes in the Paris Institution, who had lost the power of hearing in infancy. But in this, as in so many other instances, his hopes were completely frustrated; since none of the effects observed at Bourdeaux took place. It was subsequently used in a number of other cases, but, with one slight exception, with the same want of success.

M. Itard, with a degree of perseverance in the midst of such continual failures, which few men would have had, and which does him great honor, both as a benevolent and scientific man, was determined to leave no means untried, from which any rational hope of success could be drawn. On a child, therefore, of three or four years of age, whose deafness was attributed by his parents to violent convulsions, caused by dentition, he resolved to employ a new experiment. Without describing it minutely, it will be sufficient to say, that it consisted principally in the application of blisters. In this instance it was happily successful; but in forty cases in which it was subse-

* For the information of physicians, who may be supposed to take an interest in it, we subjoin the recipe.

R. Pulverized Asarabacca,	-	-	-	two drams.
Rose leaves,	-	-	-	one pinch.
Horse Radish,	-	-	-	one dram.
Parsley Root, or Stonebreak Parsley,	-	-	-	one pinch.
White wine,	-	-	-	eight ounces.
Boil to one half, strain and add				
Sea salt,	-	-	-	two drams.

quently employed, no similar instance occurred: thus, demonstrating on the one hand, in conjunction with other experiments, the *possibility* of restoring the deaf and dumb to hearing, and on the other, the great improbability in any given instance of so desirable an event.

In addition to the remedies above mentioned, a multitude of others have long been in popular use, but with nothing to support their pretensions. Of these, the most rational are various essences, alcohol, ether, and ammonia, to which electricity and galvanism may also be added; and the least so, are preparations of earth-worms, snails, ants' eggs, hog lice boiled alive, etc.

Although the employment of stimulating means was attended with so little success, a wide field for experiment yet remained, in the removal of the material causes in the ear, which prevent the free admission or circulation of sound. To accomplish this result, the two principal operations relied upon, were the *perforation of the tympanum*, and the *injection of the Eustachian tube*. The *tympanum* is a small cavity at the extremity of the canal which leads from the *auricle*, or, as it is commonly called, the ear, into the head. Between this canal, called the *meatus auditorius externus*, and the *tympanum*, is a thin membrane, termed the *membrane of the tympanum*: it is commonly known as the drum of the ear. Running obliquely downwards from the *tympanum*, and opening into the *pharynx* or back part of the mouth, is a small passage called the *Eustachian tube*. The office of the *tympanum*, is to communicate sound to the region of the ear which lies behind it. For this purpose, it is made to resemble in many respects the common *drum*: the membrane of the *tympanum* may be regarded as the drum-head, and the *Eustachian tube* as the orifice through which air passes into the drum. If now this tube be obstructed, so that no air can pass through it into the *tympanum*; or if the *tympanum* itself be filled with mucus or any other material substance; or if its membrane becomes ossified, or so thick that it cannot communicate the vibrations of sound, the hearing will inevitably be destroyed. Such accidents often occur, and are a frequent source of the deafness of the deaf and dumb. The two operations relied upon to accomplish a cure in these cases, will be treated of in their order.

I. The perforation of the tympanum.—The advantage of this operation may be considered as the result either of the free entrance of sound, striking immediately upon the sensitive parts of the organ

of hearing, and thus becoming perceptible; or of the renewal of the air in the cavity of the tympanum, which, in consequence of the obstruction of the Eustachian tube, had undergone certain physical changes, of a kind to injure the transmission of sound. The two cases, then, in which it would seem to be useful, are when the membrane of the tympanum has acquired an unnatural thickness, and when the interior aperture of the ear has ceased to be permeable.

The utility of this operation was originally suggested by *Riolan*, and subsequently by the celebrated *Cheselden*; but M. *Eli*, a Paris surgeon, is supposed to be the first who actually performed it. *Eli*, however, died young, and his experiment and even his name were nearly forgotten, when *Sir Astley Cooper*, in the year 1800, again revived the practice, and performed the operation on a number of deaf persons. His success for a time appeared so promising, that his reputation was at once extended, and the perforation of the tympanum, in the mode which he pointed out,* was immediately practiced in France and Germany. But its very popularity finally proved its ruin; for it was soon discovered, from the numerous cases in which the operation was performed, without producing any favorable result, that little reliance could be placed upon it, as a means of cure.

The same operation was also performed a number of times by *Hymly*, a German physician, but with no better success. Instead of the simple *trocar* of *Cooper*, he employed a very sharp instrument in the form of a punch, the object of which was not only to perforate the tympanum, but to remove a portion of the membrane. His utmost efforts, however, could not prevent the aperture from closing, and becoming healed even more rapidly than that made by the *trocar*. On one individual, he performed the operation *four times*, without being able to preserve the opening. He hence inferred that if ever the operation is successful in restoring the deaf to hearing, the cure is always temporary.

The idea, however, of restoring the sense of hearing to the deaf and dumb by means of perforating the tympanum, was not yet abandoned. *Cooper* and *Hymly* had indeed met with little success, but it was hoped that some modification or improvement of the instruments they employed, would be productive of more fortunate results. In place, therefore, of the *trocar* of *Cooper*, a similar instru-

* *Phil. Trans. of the Royal Soc. of London, for the year 1801.*

ment, but of larger dimensions, was introduced ; that of Hymly was abandoned ; and a piece of cat-gut, or the end of an India-rubber probe was inserted in the aperture made in the membrane, for the purpose of preserving it : but it was soon found that notwithstanding all the efforts of ingenuity and skill, the object to be attained was as distant as ever. Itard indeed invented an instrument, which was in a great measure free from the objections urged against those of his predecessors, since its use was followed neither by cicatrization, nor by dangerous inflammation of the internal ear. Although, with these advantages, he performed the operation of perforating the tympanum in a number of cases of accidental and congenital deafness, he frankly confesses that his success was completely ephemeral. He has therefore entirely renounced its employment.

M. Deleau, a young French surgeon, who has made himself as much noted by his bold assertions of the cures of deafness he has performed, when others were confident there were none, as by his ingenuity and perseverance, was not however discouraged by the failure of his predecessors. Having contrived an instrument more complicated in its structure, than any which others had previously used, and which, he alledged, if skillfully employed, would render impossible the obliteration of the aperture in the membrane of the tympanum, he commenced a new series of experiments. The results of twenty five of these, which he deemed most successful, he published in 1822 in a work entitled *Mémoire sur la perforation de la membrane du tympan*, etc. In reading this essay, it is difficult to avoid the conviction, notwithstanding the constant effort he makes to show the remarkable success he has met with, that even if truly related, it is scarcely worth mentioning. In some cases, to his great disappointment, the aperture closes ; in others, a promising subject, when just about to demonstrate the complete success of his operation, is afflicted with a cold, or some form of disease, and again plunged into his original state of deafness. Sometimes the parents are perverse enough to deny that the hearing of their children is improved, and sometimes the children hear well enough, but utterly refuse to talk ! To judge from the cases before us, he seems to have succeeded in every thing, except restoring his patients to the full and permanent use of the sense of hearing. In this, it is perfectly evident, he met with no success. *He has not recorded a single instance, in which a patient was so far restored to hearing, as actually to have acquired the use of language.* At the same time,

it is equally evident, that the hearing of some of his patients was somewhat improved, although probably in most of the cases, the cure was merely temporary. The fact that he has abandoned the use of the instrument he invented, and that in his later writings scarcely any mention is made of the operation itself, more conclusively proves its inutility, and the little success with which it was actually attended, than any arguments which others could possibly advance.

At the institution for the deaf and dumb at Groningen in Holland, the operation was performed by the celebrated Professor *Hendriksz* and Dr. *C. Guyot* on *eighty one* individuals. Of these eighty one, there were only seventeen, whose hearing seemed to be in the least improved ; and even of these, fourteen, before the expiration of nine months, relapsed into their original state of deafness. The remaining three preserved their artificial hearing, but not to such an extent, as to be of any use to them in the acquisition of language.*

The results, then, of the operation of perforating the tympanum,—an operation which has been performed in a great number of cases, and by a large number of skillful surgeons, have been such, that no rational hopes can be founded upon it, as a means of restoring the deaf and dumb to hearing and the use of speech. Dr. *Wright*, an English surgeon, who has written a very candid work on deafness and its remedies,† strongly objects to the practice. He affirms that atmospheric air, which passes through the membrane of the tympanum, does not become regulated in temperature, as it does when passing naturally through the Eustachian tube ; that by perforating the tympanum, the painful sensibility of hearing, which at first takes place, is shortly followed by a partial or total obliteration of the faculty, occasioned by the unnatural and immediate vibration of sound, striking upon the fine membrane and producing an excessive degree of tension ; and that atmospheric air, in its passage through the Eustachian tube, probably undergoes certain physical changes, which it cannot do, when entering the cavity through the membrane of the tympanum.

* *Deuxième circulaire de l'Institut royal des sourds-muets de Paris, etc.* Paris, 1829.

† *An essay on the human ear.* London, 1817.

Although other distinguished physicians have not coincided with Dr. Wright, in regard to the injurious effects of the operation, they have with great unanimity testified to its inutility. "Profesor *Dubois*," says M. *Richerand*, "has performed the puncture of the *membrana tympani* four times without success, on subjects aged from thirty to fifty years. This inutility of the operation, proved by the four instances so well authenticated, will tend to make the correctness of other observers doubted—at least to show that one should not always promise himself success."* "I entertain, in that respect," observes M. *Saissy*, "the opinion of Professor Richerand, and I will also add, that there are a great many circumstances which may defeat the operation. In other cases, success will be but temporary. There will be but few cases in which it will be successful."† In speaking of the operation, M. *Berjaud* remarks;‡ "The merited neglect into which it has fallen on the part of the most distinguished of the Paris practitioners, and the judicious opinion long since expressed by Professor Richerand, confirm in a stronger manner than any thing that I can say, the impotence of the perforation of the tympanum against congenital deafness, and the discredit into which it is gone, even in the cases of occasional infirmities of the same nature. A most conclusive proof, and one which I ought not to omit, is this;—that when the operation was so common in France, it was performed on nearly all the deaf-mutes at that time in the Paris Institution, as well as on others who were afterwards admitted, without the least advantage."

M. *Itard*, to whom we have alluded as having met with no success in the perforation of the tympanum, devised a new mode of operation, which seemed for a time to promise success. Having found in two deaf-mutes, who had died within a few months of each other, the internal ear completely obstructed by concretions, composed in one, of thick mucus, and in the other, of a matter resembling chalk, he inferred that congenital deafness might be produced in certain cases by a material cause, and that this cause might be removed. To do this, he decided on injecting the cavity of the

* *Nosographie chirurgicale*, Tome ii, p. 132; as cited by *Saissy*.

† *An essay on the diseases of the internal ear, translated from the French, by Nathan R. Smith, M. D., Prof. of Surgery in the University of Maryland.* Baltimore, 1829.

‡ *Examen critique de cette question; Dans l'état actuel des sciences médicales, peut-on rendre l'ouïe et la parole aux sourds-muets de naissance?* Paris, 1827.

tympanum *through the membrane*, with the view of expelling the concretions through the Eustachian tube. By a fortunate chance, the first deaf-mute, upon whom he undertook to perform the experiment, was precisely of that small number, who owe their defect to the cause in question. The patient was a child, twelve years of age, and deaf from birth, named Christian Dietz. His restoration to hearing was almost complete, and he would probably have recovered the use of speech, had his life been continued. He was attacked, however, with a disease which baffled medical skill, and occasioned his death a few months after the operation.* M. Itard was induced by the encouraging result of this experiment, to perform the same operation on twelve other deaf-mutes, but its inutility from these cases, became so evident, that he abandoned it in despair.†

II. *Injection of the Eustachian tube.*—The attention of physicians was next directed to the injection of the Eustachian tube. The end to be attained was the same as before—the free admission of air into the cavity of the tympanum. The possibility of this operation was first suggested by *Guyot*, a post master at Versailles, who was afflicted for many years with deafness caused by mucus which obstructed the tube. He performed the operation on himself, and in 1724 presented the instrument he had employed to the Royal Academy of Sciences. “The most important part of this instrument,” say the committee, “is a curved tube, which is passed deep into the mouth, behind and above the palate, so as to be applied to the extremity of the canal to be injected. It will serve at least to wash the mouth of the Eustachian tube, and will thus, perhaps, in certain cases, be useful.”‡ This language sufficiently indicates the distrust with which the committee regarded the alledged injection. The faults of the operation were in fact so prominent, and the impossibility of performing a perfect injection through the mouth was so apparent, that it was abandoned for nearly twenty years. The idea however had once been suggested, and it required only that some improvement should be proposed again to bring it into notice. This was done by *Cleland*, an English surgeon. He recommended

* A minute and interesting report of this case will be found in Itard's *Traité des maladies de l'Oreille et de l'Audition*: Tome ii, p. 464, et seq.

† *Revue médicale Française et Etrangère, et Journal de Clinique*, etc., Avril, 1827, p. 34.

‡ *Hist. de l'Acad. Royale des Sciences*, année 1724. p. 37.

that in place of the leaden tube employed by Guyot, a flexible one of silver should be substituted and directed into the Eustachian tube *through the nose.** This operation was first actually performed by *Douglas*, on several dead subjects, and shortly afterwards by *Wathen*, on a number of living patients. The latter published an account of five cases in which he supposed more or less benefit had been derived from the operation.† But subsequently, as we learn from Dr. Sims, a late President of the Medical Society of London, “he became less sanguine in his hopes of cure from it, than he was originally.”‡ As late as 1791, it was proposed by *Lentin*, who had somewhat modified the original method of Guyot, to pass the injection through the mouth,§ but the conviction of its impossibility, or at least its extreme difficulty had become so general, that no one appears to have adopted his suggestion. The injection through the nose, on the contrary, was performed by *Sabatier*, *Leschevin*, *Desault*, *Saissey*, *Boyer*, *Itard* and others, nearly all of whom either invented new instruments or proposed some modification of those already in use. But although the operation had now been practised for nearly a century, it may be considered as having demonstrated nothing, except the practicability of the injection of the Eustachian tube, and the little reliance which could be placed upon it as a means of cure, when *M. Deleau* undertook another series of experiments, which he affirmed had at length proved that the deaf and dumb might be restored to hearing and speech. The committees appointed by the Royal Academy of Sciences, reported as favorably of his success as Deleau could possibly have desired. The newspapers eagerly seized hold of what so nearly approached the marvellous, and circulated the most exaggerated reports of his magic power. As these accounts were extensively copied into the papers in this country, it is not improbable that many of our readers will remember them.

There were some, however, who, in the midst of this general enthusiasm, had the boldness to doubt the reality or at least the extent

* *Phil. Trans. of the Royal Soc. of London*, for the year 1741. Vol. xli. p. 847.

† *Ibid.* for the year 1755. Vol. xlix. p. 213.

‡ *An essay on the deaf and dumb; shewing the necessity of medical treatment in early infancy; with observations on congenital deafness.* By JOHN HARRISON CURTIS, Esq. London, 1829. 8vo. p. 173.

§ *Tentamen vitiis auditus medendi, etc; in Commentationibus societatis regiae scientiarum Gottingensis ad 1791 et 92.* Vol. xi. p. 39.

of the wonderful cures alledged to have been performed. Themselves physicians and surgeons, and many of them distinguished for their knowledge of the anatomy and diseases of the ear, they were too well acquainted with the little success which had attended the efforts of others, and with the intrinsic difficulty of the subject, to believe that it had all at once been so entirely surmounted, that henceforth deafness would be as easy of cure as other diseases. In reply to the numerous cases of restoration to hearing which M. Deleau was constantly publishing, they affirmed that some of his operations were precisely such as had been repeatedly performed before him, with not the least success ; and that others were anatomically impossible. They complained that no information was given of the condition of the patients after the operation ; and denied, in short, that any cures had really been effected. In answer to these objections, he seems to have relied in a great measure upon his apparent success in the case of a boy named Trézel. As this case excited great interest at the time (1825) both in England and on the continent, we present the report of the committee of the Academy of Sciences nearly entire.

“ Claude-Honoré Trézel, at this time ten years of age, born at Paris, of poor parents, was of that class of the deaf and dumb which cannot hear the loudest noises nor the most violent explosions. His countenance had little expression ; he dragged his feet in walking, and his gait was tottering. He did not know how to wipe his nose, and he made his principal wants known by a certain number of signs.

“ Nothing remarkable occurred during the operation, which is very simple and by no means new. It consisted in the injection of liquids into the Eustachian tube, by means of a small flexible *sound*. The first few days after the development of hearing, was a season of continual delight to the child. Every kind of noise gave him inexpressible pleasure, and he sought for them with great eagerness. It was not, however, till after some time that he perceived that speech was a means of communication : this he still attached not to the sounds that issued from the mouth, but to the movement of the lips. Accordingly, for some days, he thought that an infant of seven months old spoke, because he saw the movements of the lips. He was soon taught his error, and informed that it was only to the sounds that importance belonged. It happened, unfortunately, that he heard a magpie pronounce some words,—then generalizing this fact, he thought that all animals could articulate, and actually en-

deavored to make a dog speak. He employed considerable violence to make him say *papa*, *du pain*, the only words which he himself could pronounce. The cries of the poor animal alarmed him, and he desisted from his attempt.

“The earlier period after the development of hearing wrought a considerable change in the physical state of Trézel. His step became firmer ; the mournful air of his countenance changed to one gay and smiling ; he learned to wipe his nose, and ceased in walking, to drag his feet. A month elapsed, and Honoré, absorbed in his new sensations, remained in nearly the same state. He could not seize the different syllables of which compound words are formed,—much less know their signification, or even that of short and simple phrases. He required much time also to enable him to distinguish the direction of sounds. His instructor, having concealed himself in a room in which the child was, called him by name ; and it was only with the greatest difficulty, that he could discover the person who spoke, and even then, it was rather by his eyes and reason than from the sound, that he discovered it.

“The first sounds which Trézel pronounced without difficulty, were *a*, *o*, *u*, etc. ; and the first words which he formed, were *papa*, *tabac*, etc. ; but when he wished to pronounce more complicated words, he made great contortions of the lips, tongue, and all the parts concerned in articulation. By repeated efforts, he became able to pronounce a few compound words, which at first were far beyond his power. When advanced thus far, he believed himself on an equality with other children of his own age : and satisfied with himself and proud of his new situation, he looked with great disdain on his former companions in misfortune. Notwithstanding, however, this slight exhibition of vanity, Trézel made but little progress in pronunciation ; a vast number of syllables escaped him, or he articulated them in a very defective manner. Perhaps he would never have surmounted this difficulty, had he not ceased to depend entirely upon his ears, and assisted himself by his sight. Several words were written, and he pronounced them much more distinctly, catching with considerable clearness, the assemblage of the vowels and consonants, and their reciprocal influence. Another very remarkable fact may also be stated, viz. that the association between the sight and the movements of the larynx, was always prompt and easy ; while that of hearing, and the organ of voice was always difficult, and slowly exercised. For instance, as soon as Honoré

perceived the written syllables, he pronounced them, if at the same time they were repeated to him ; but if the writing was removed, the syllables were in vain articulated in the most distinct manner ; he could not follow them.

“ His pronunciation is very defective ; the *r* rolls disagreeably upon his tongue, and the differences in accent appear unknown to him. He exhibits also a phenomenon which has engaged the attention of the commissioners. When they spoke a word distinctly to him, he repeated it immediately ; but if his instructor wished to address his understanding, signs and expressions of countenance were employed. It would have been thought, that after having acquired a new mode of expressing his wants and ideas, he would have neglected that which had formerly served him, and which is inferior to speech ; but hitherto, the contrary has happened. The natural language of Honoré, *i. e.* by signs, instead of going gradually into disuse, and being replaced by speech, has rapidly gained a degree of perfection and force which it did not possess before he had acquired the sense of hearing.

“ In recapitulation, Honoré Trézel, who, a year ago, was so completely deaf as not to be able to hear the loudest noises, understands all kinds of sounds, knows when they come from a distance, distinguishes their character, avoids carriages and horses, and proceeds to open the door when any one knocks. He is pleased with music, and can appreciate and repeat all the articulations of the French language. He obeys the spoken commands of his instructor, but does not yet sufficiently understand other people : and he learns, analyzes and repeats a number of phrases at length.”*

This report, plausible as it is, did not excite, in the minds of physicians who were most interested in the subject, that confidence, which ordinary readers would probably give it. It was asserted that some of the statements of M. Deleau, with regard to the operation, were to any one acquainted with the anatomy of the ear, utterly incredible ; and that the brevity and obscurity with which the operation was described, were such as to destroy, or at least very much to impair all confidence in its truth. It was affirmed too, that a palpable contradiction existed between the report presented to the Academy of Sciences and the account of Deleau ; for while in the

* *L'ouïe et la parole rendues à Honoré Trézel, sourd-muet de naissance, etc.*
Paris, 1825.

former of these documents, the operation is said to have consisted in the injection of *liquids*, in the latter we are told that it consisted in the injection of *air*.

The true subject of inquiry, however, and the only one worth settling, is the actual degree to which the child acquired the sense of hearing. The operation was performed in April, 1824; and the report we have cited above, was made in June, 1825. During this period, he had learned, we are told, "to appreciate and repeat all the articulations of the French language. He learns, analyses and repeats a number of phrases at length, and obeys the spoken commands of his instructor." But M. Berjaud, in 1827, two years after, gives a somewhat different account of his progress. "I have seen Honoré Trézel," he says, "at two different times. At my second visit, which took place a year after the first, the child was no farther advanced in his education, than when I first saw him. He continued to recite the three or four first verses of La Fontaine's fable of the fox and the crow; but when I distinctly asked him this simple question: *do you love sugar plums?* (bonbons) he was so perfectly confounded that he could only look at his instructor, and stupidly repeat *bo, bo.*"* In one of Deleau's works, however, published in 1830, we find the following note: "Honoré Trézel has forgotten his former language, (of signs): he speaks and talks with the greatest facility. He is constantly increasing his knowledge by reading books, such as are usually put into the hands of children of eight or ten years of age."[†]

The question still occurs, was an actual cure in this instance performed?—was the child really restored to the full and perfect exercise of the sense of hearing? Even if the most favorable account of the child's facility in speaking be admitted not to be at all exaggerated, it by no means follows that the sense of hearing was really recovered; for nearly six years, it must be remembered, had passed since the operation had been performed, and during the whole of this period, he had been under constant instruction in articulation. In this time, he might have learned to "talk and read juvenile books," even if his hearing had not been in the least improved; since the same acquisition is made in half the Institutions in Europe,

* *Examen Critique, etc.*, p. 46.

† *Extrait d'un ouvrage inédit intitulé Traitement des maladies de l'Oreille moyenne qui engendrent la surdité.* Paris, 1830, p. 25.

and within the same period, by those who are profoundly deaf. If the child's hearing had been perfectly restored, it is not for a moment to be admitted, that nearly *six years* would have been necessary to enable him to speak. As that time, however, was actually employed, and the period required to teach those who remain deaf to speak, is no greater, we are compelled to conclude, either that his hearing was entirely useless to him in acquiring the use of spoken language, or that he never, in fact, recovered it. Itard and Berjaud have adopted the latter supposition, and have endeavored to show that this alledged cure was simply a successful instance of instruction in artificial articulation. The conclusion derives considerable plausibility, from the fact that Deleau strongly insists upon the necessity of a special education of several years, for those whom he has *cured*, and that in this case, he does not deny, that *six years* of constant labor have been spent to accomplish the result produced. It seems more natural, however, on the whole, to suppose that the hearing of the child was really improved, but in so slight a degree, that nearly the same course was necessary to teach him to speak, as that employed in Europe with the deaf and dumb for the attainment of the same object.

We have been thus minute in examining the case before us, because it has already begun to appear in the medical books, as an undoubted instance of perfect restoration to hearing. But in this, as well as in the subsequent cases of success, published by Deleau, we look in vain for the evidence on which to found such a conclusion. Of the numerous cures which he claims to have performed, it is at present sufficient to remark, that none of them are even so plausible as that of Trézel, and that in France, by men who are best capable of judging, little or no credit is given to them. A full examination of the several publications of M. Deleau, would properly belong to the pages of a medical journal. It may here be remarked, however, that judging from his later works, injections of air (*douches d' air*,) seem finally to have taken the place of nearly all other remedies. Of the little value of this harmless operation, physicians can easily judge.

The success which seemed for a time to have crowned the efforts of Deleau, induced the Council of Administration of the Royal Institution for the deaf and dumb at Paris, to request of M. Itard, a report on the advantages which might reasonably be expected from various remedies, if employed, on a large number of their pupils.

No man in Europe was better prepared to make such a report than Itard. For nearly thirty years he had been at the head of the medical department of the Institution, and during that time, had been unwearied in his efforts to restore the deaf and dumb to hearing. He had made himself acquainted with all that had been known by his predecessors on the anatomy and diseases of the ear, and had written the most elaborate work which had ever been published on this difficult subject.

In consequence of his report, it was decided that a certain number of the mutes in the Institution should be subjected to medical treatment. As nearly every other remedy had previously been employed in vain, Itard determined to make a thorough experiment of the utility of injecting the Eustachian tube. He therefore, performed the operation in *one hundred and twenty* cases, the results of which were, to use his own language, "just nothing, with regard to hearing, in the great majority of the mutes, and in the rest, temporary and of little advantage.*

With this conclusive experiment, the great efforts which for several years, had been made in France to restore the deaf and dumb to hearing, may be considered to have ended. M. Deleau, indeed, still continues to practice in cases of deafness, but no important facts of a more encouraging nature, so far as is known, have since been brought to light. It is now, we are informed, the general opinion among those in France, who are capable of judging on the subject, that these numerous and long continued experiments have proved that the sense of hearing cannot be perfectly restored to the deaf and dumb, although it is admitted that it may sometimes be improved. This conclusion, the efforts of both Itard and Deleau, we think, have abundantly shown. Although a few cases of perfect recovery have undoubtedly occurred, they can be regarded only as isolated exceptions, and do not destroy the general principle, that *congenital deafness cannot be cured*.

* *Deuxième rapport, lu, le 9 février, 1827, au Conseil d'Administration, etc.,*
p. 11.

ART. VIII.—*On an instrument proposed for measuring the expansion of Solid Bodies, and which may also be used as a Thermometer;* by W. W. MATHER, A. M., and Lieut. U. S. Army.

It has long been a desideratum to measure the expansion of bodies, and the changes of temperature, more accurately than these can be done by the instruments which are or have been in use. Every scientific man is aware of the practical utility of a solution of the two points mentioned, and more particularly, in geodesic operations, where the accuracy of extensive surveys is dependent on a rigid determination of the length of the base line, and in the true determination and verification of weights, and of measures of length and capacity. An instrument for such purposes, becomes more valuable in proportion to its accuracy and its capacity, for rigid verification. The mode of determining the expansion of solids employed by Messrs. Lavoiser and Laplace, is of all the methods that have been employed, the least exceptionable, and probably their determinations, as far as they experimented, are close approximations to the true expansions.*

Mr. Hassler's method of measuring the expansion of his measuring rods by means of micrometer screws, is very ingenious, and it is surprising how close his approximations are to those of Lavoisier and Laplace, when we consider the possible error arising from the probable slight flexure in his long wire rods.†

Thermometers all labor under an objection, which it has not, hitherto, been practicable altogether to obviate, and the one that I shall propose, will probably labor in a slight degree, under the same objection, if employed at a higher temperature than the ordinary ranges of atmospheric heat and cold. This objection, in the thermometers hitherto used, arises from the different rates of expansion of the bodies used in their construction, and from there being no means of testing rigidly, the rates of expansion in each individual case. The fact is notorious, that scarcely any two thermometers, however carefully constructed are strictly comparable, and hence, the utility of the instrument in minute scientific investigations is much less than might be expected. To the same defect are to be attributed, in

* A description of their instrument and mode of experimenting may be seen in Biot, *Traité de Physique*, or more in detail in the *Mémoirs de l'Institut*.

† Vide Hassler on the Coast Survey of the U. S. in the *Am. Phil. Transactions*.

